

# Progress report on “Cloud detection and avoidance for the LDCM”

***PI: Lazaros Oreopoulos (JCET-UMBC)***

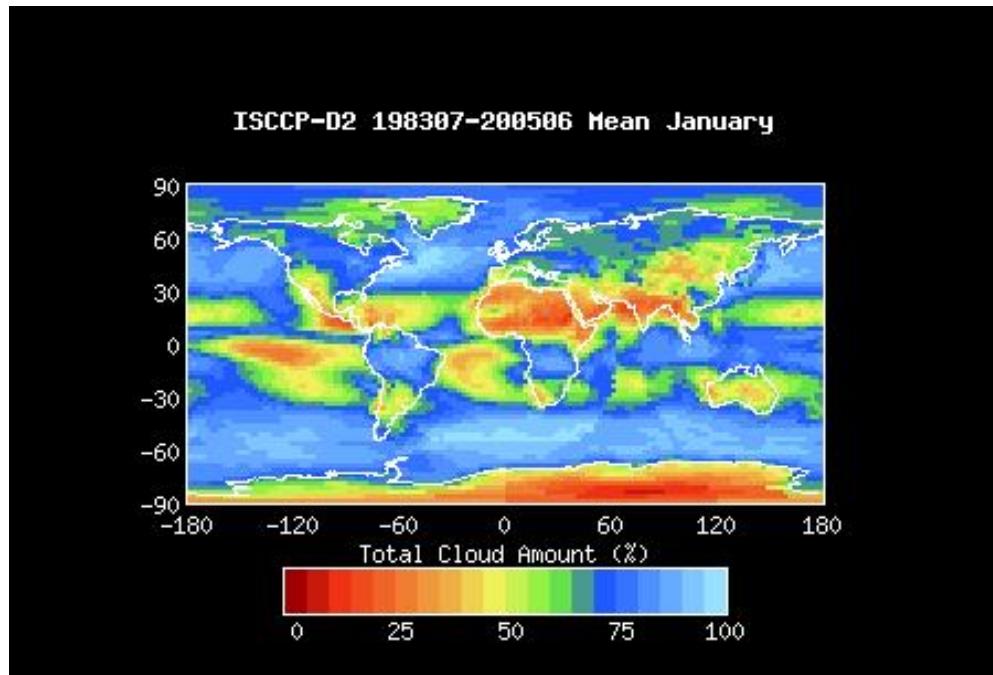
***With contributions by:***

*Tamás Várnai (JCET-UMBC)*

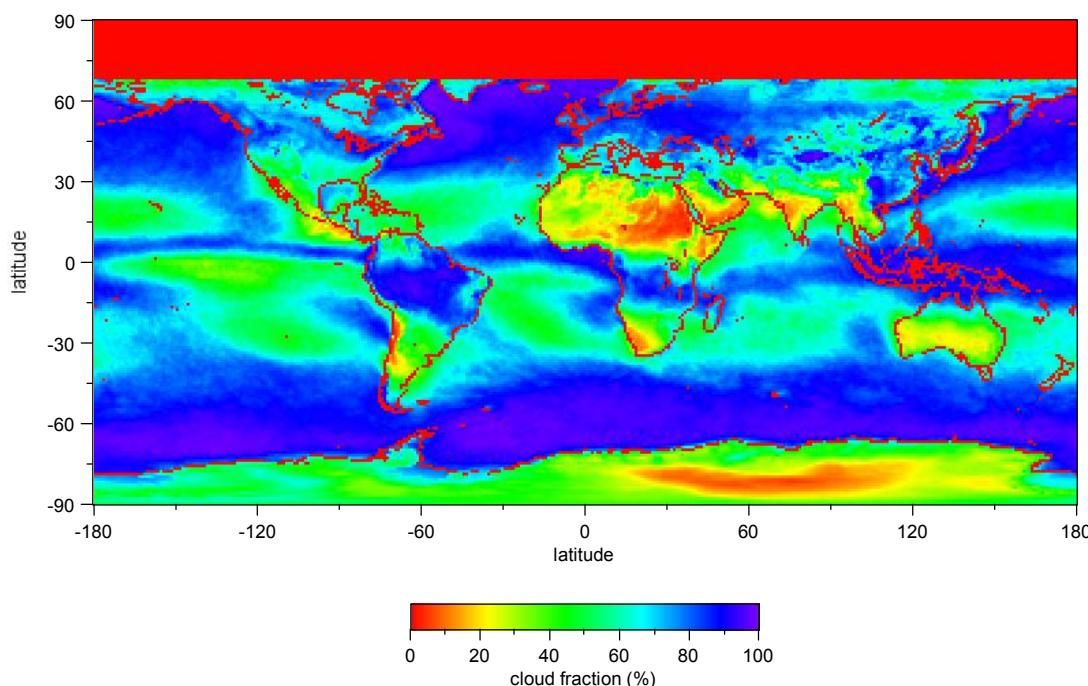
*Richard Irish (SSAI)*

**Topics:**

1. MODIS Cloud Climatology for GMAP
2. Lessons from MODIS cloud detection
3. Experiments with simplistic ACCA



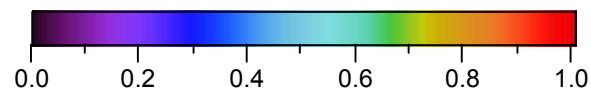
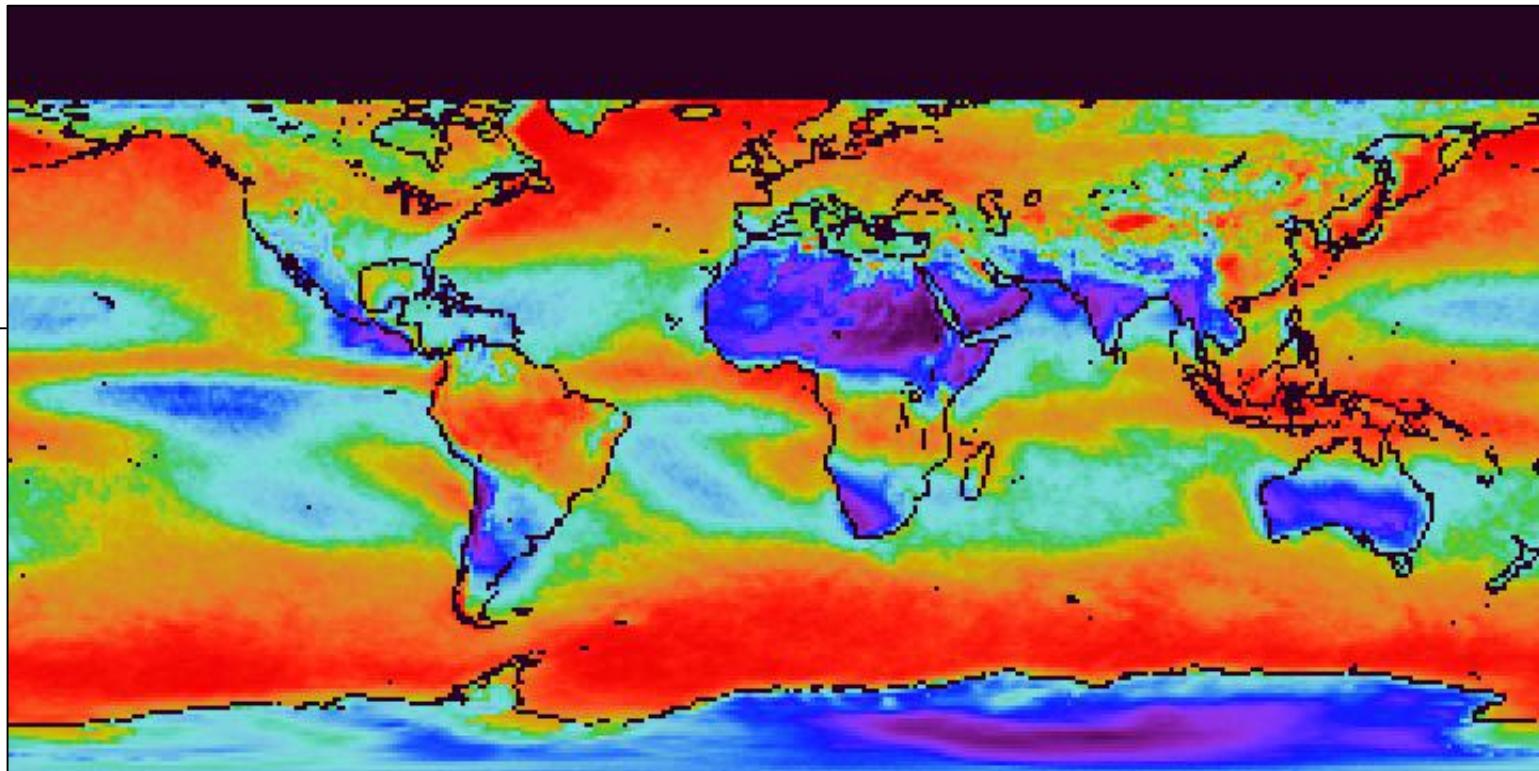
**ISCCP 12-year  
(used by L7's LTAP)**



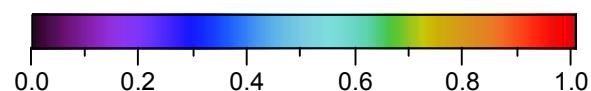
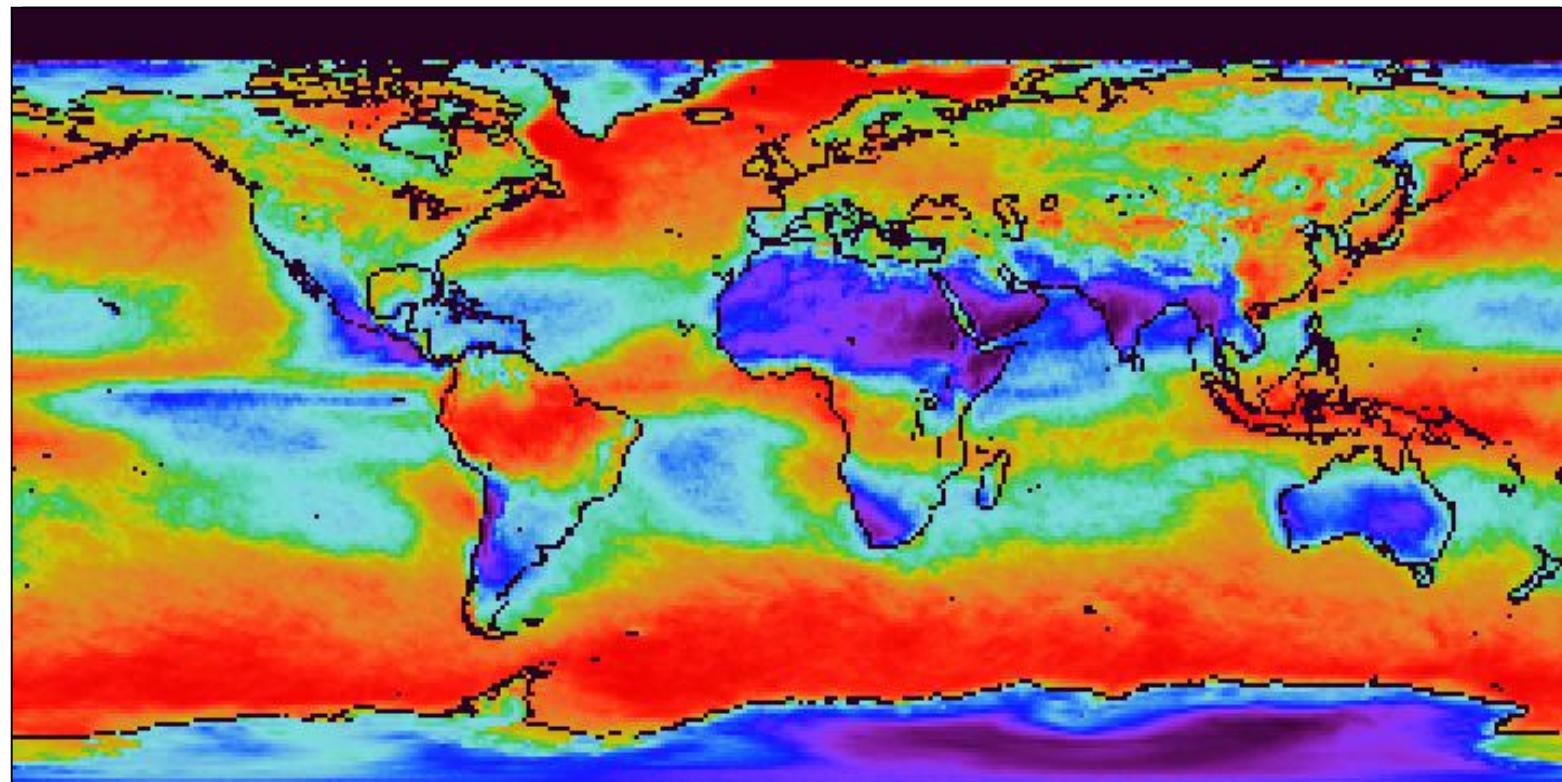
**January**

**MODIS Terra 7-year  
(expanded set candidate  
for GMAP)**

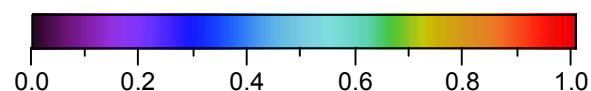
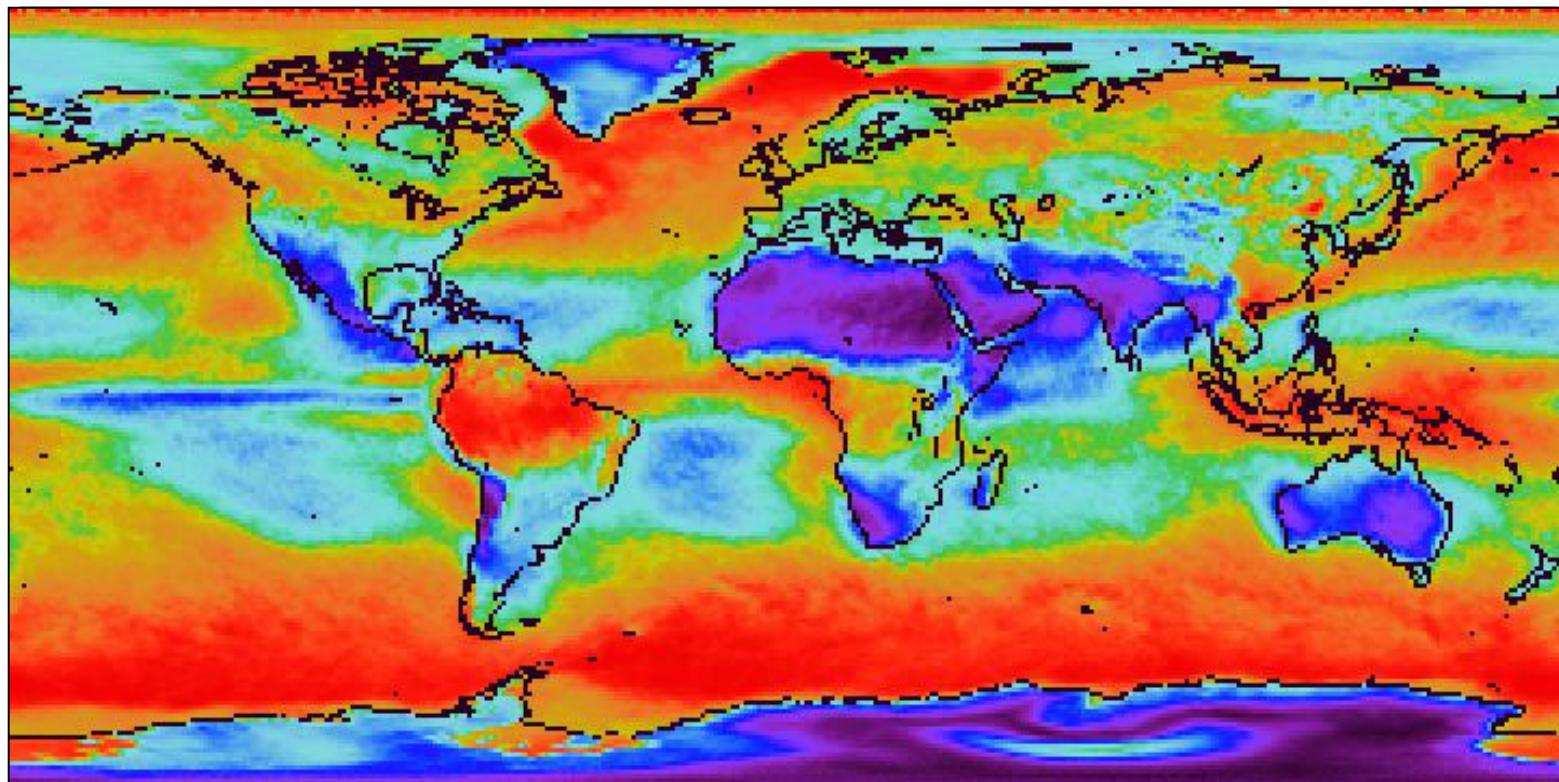
# January



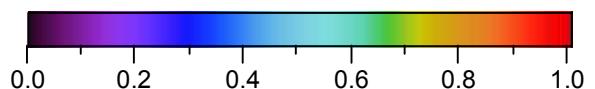
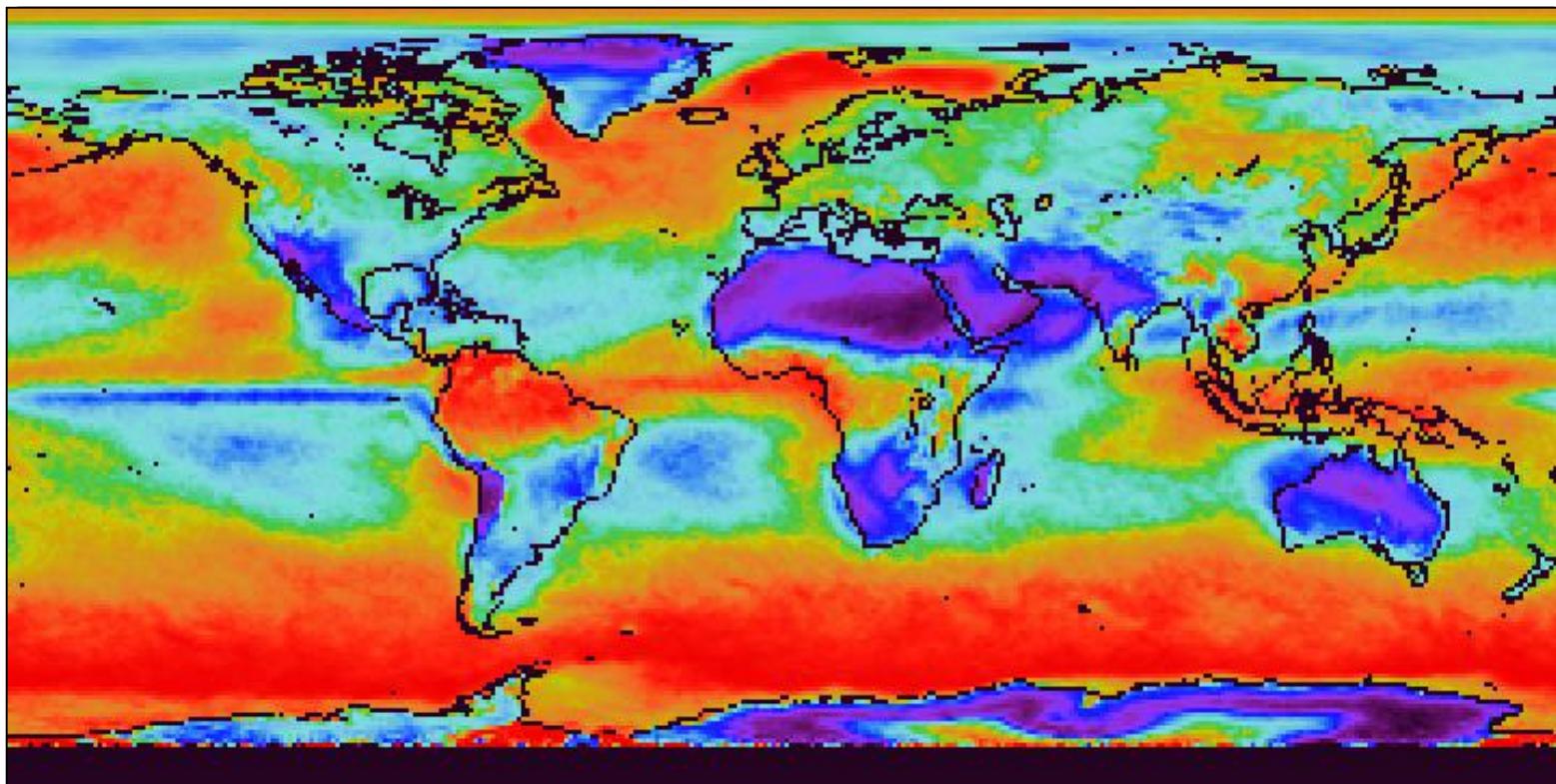
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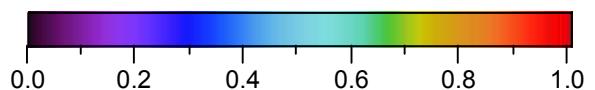
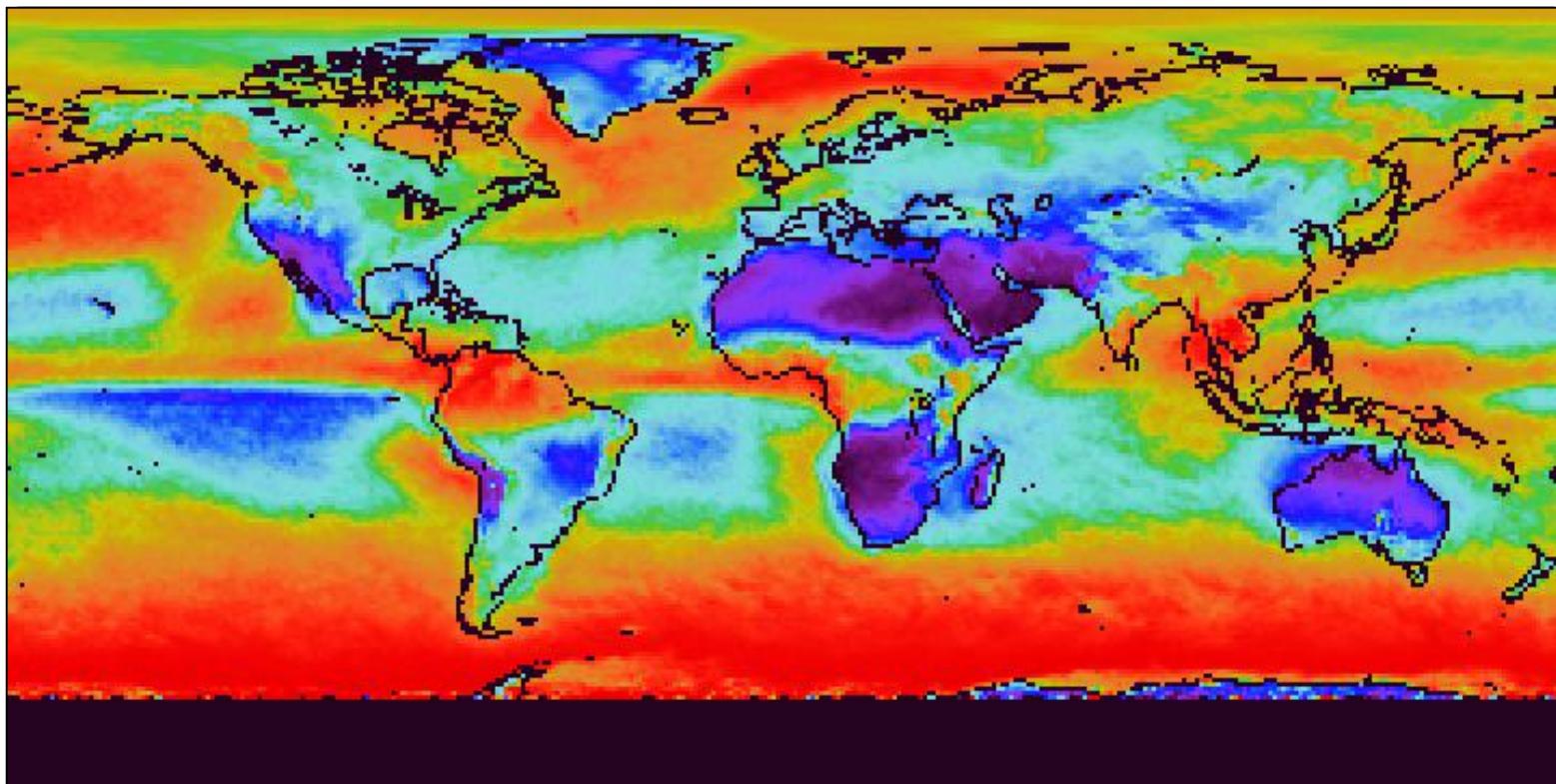
March



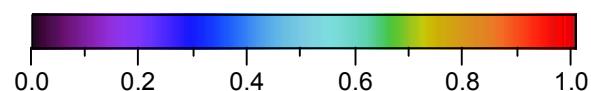
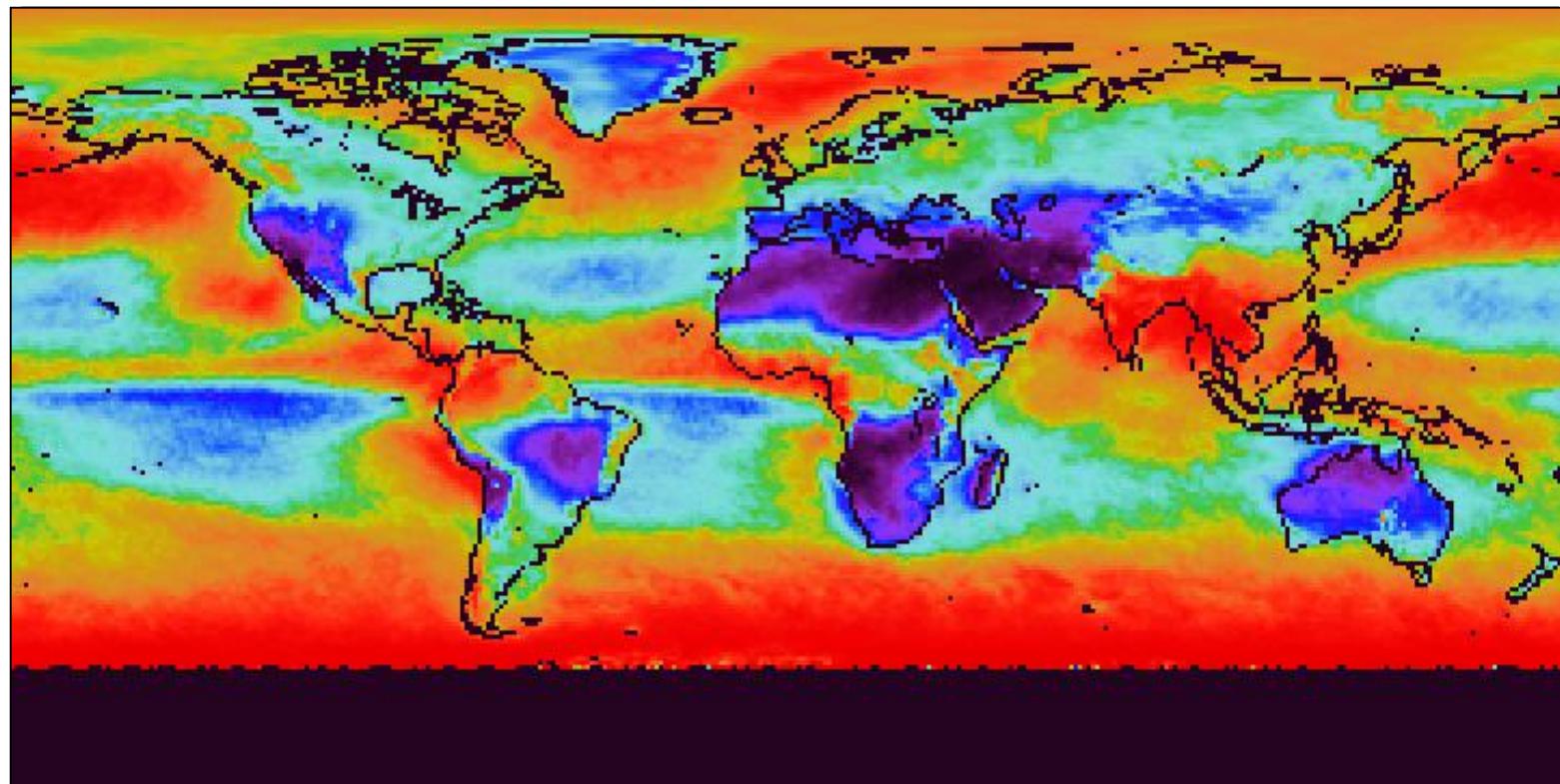
April



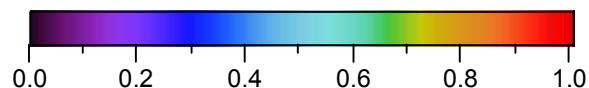
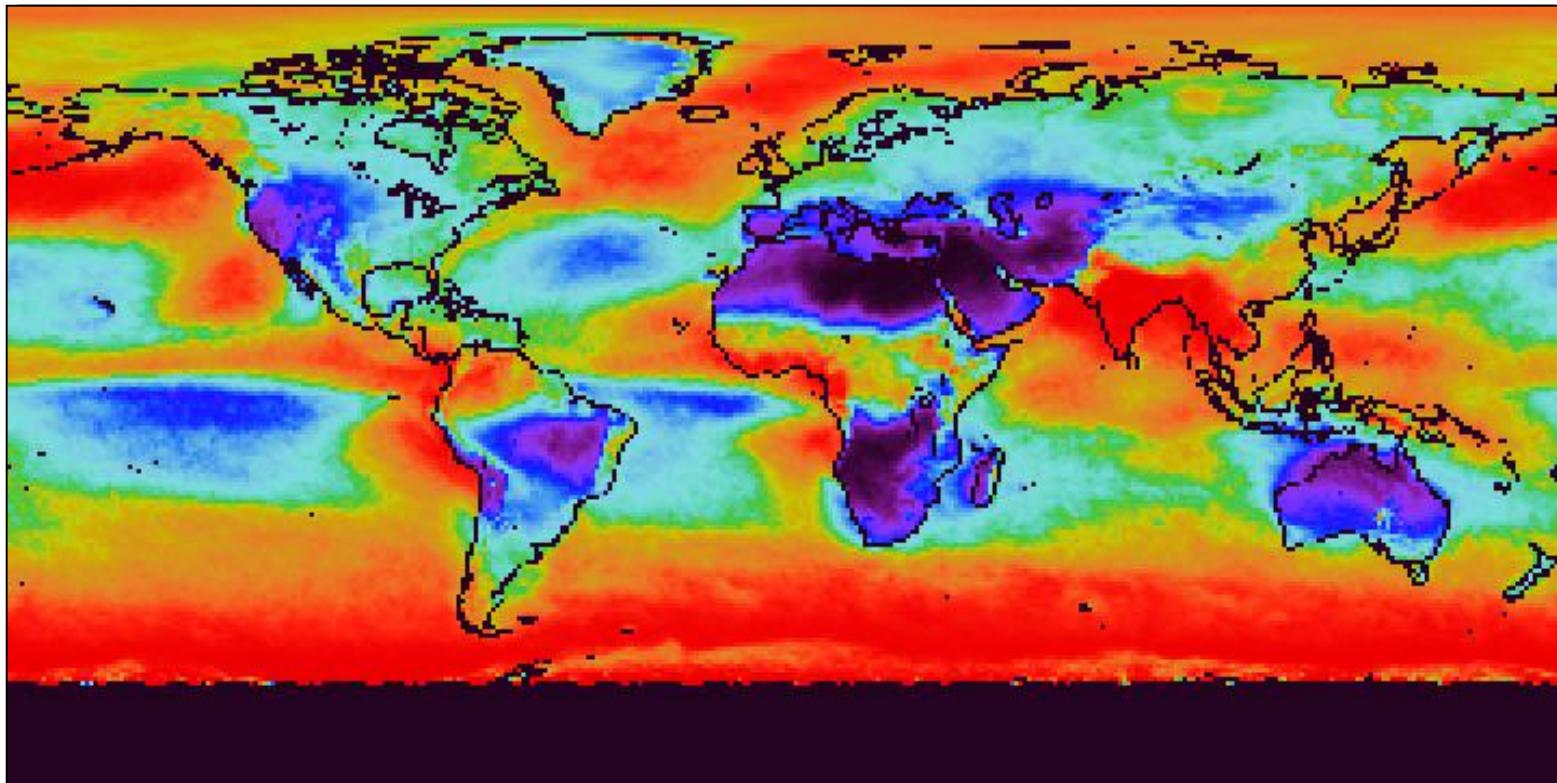
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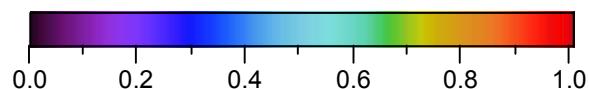
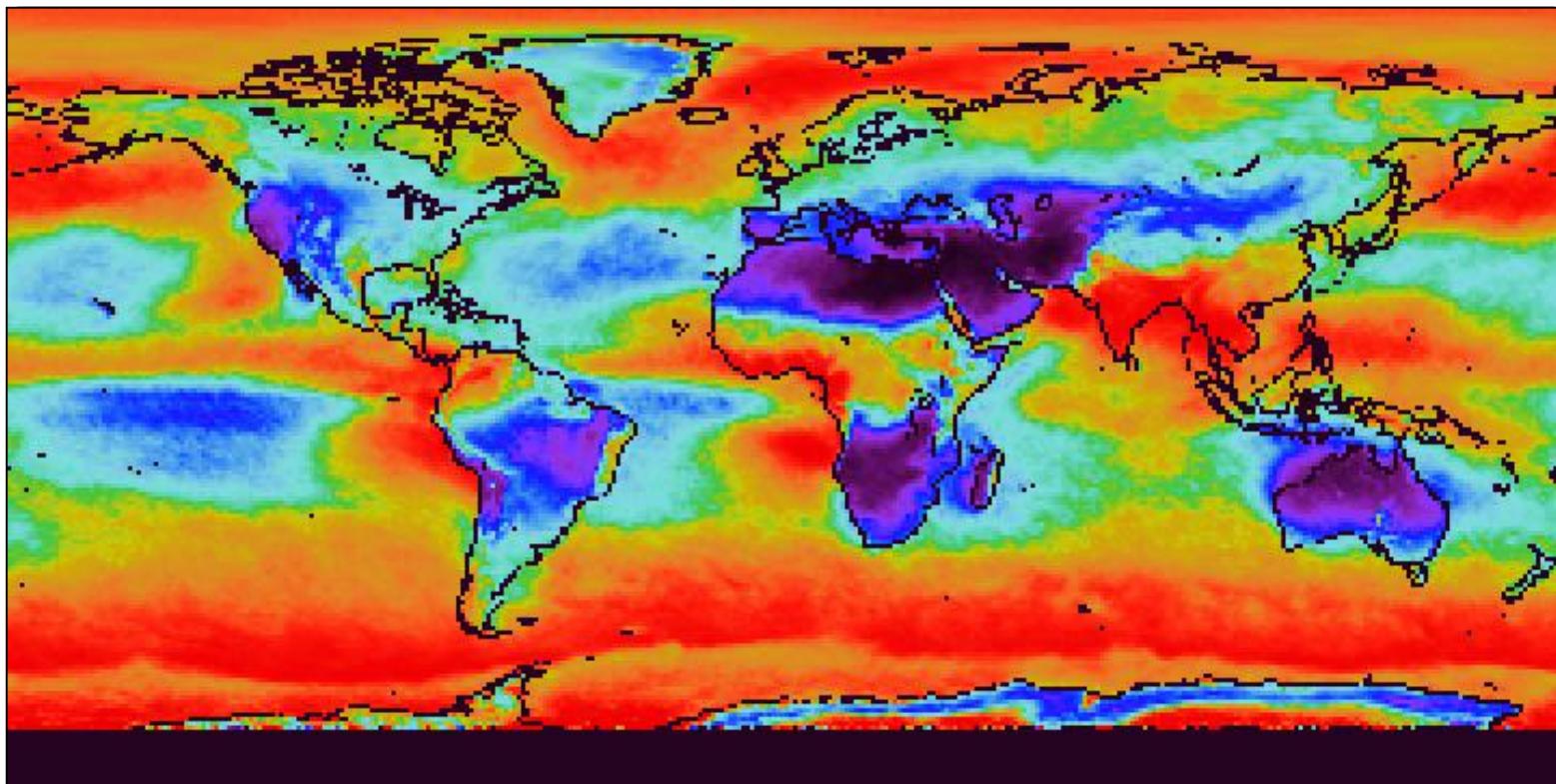
June



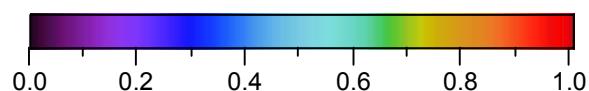
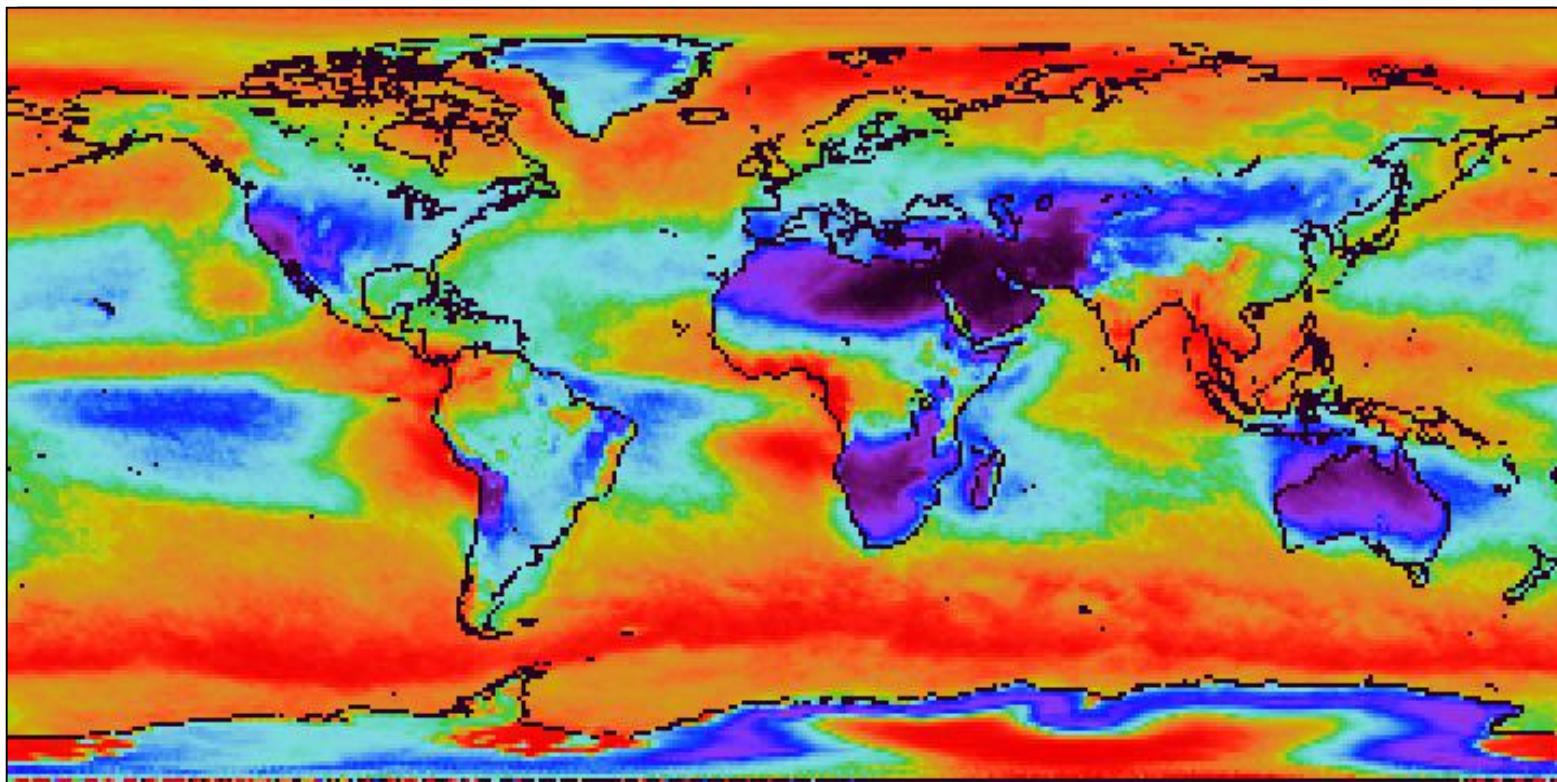
July



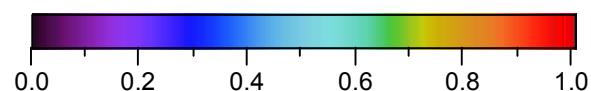
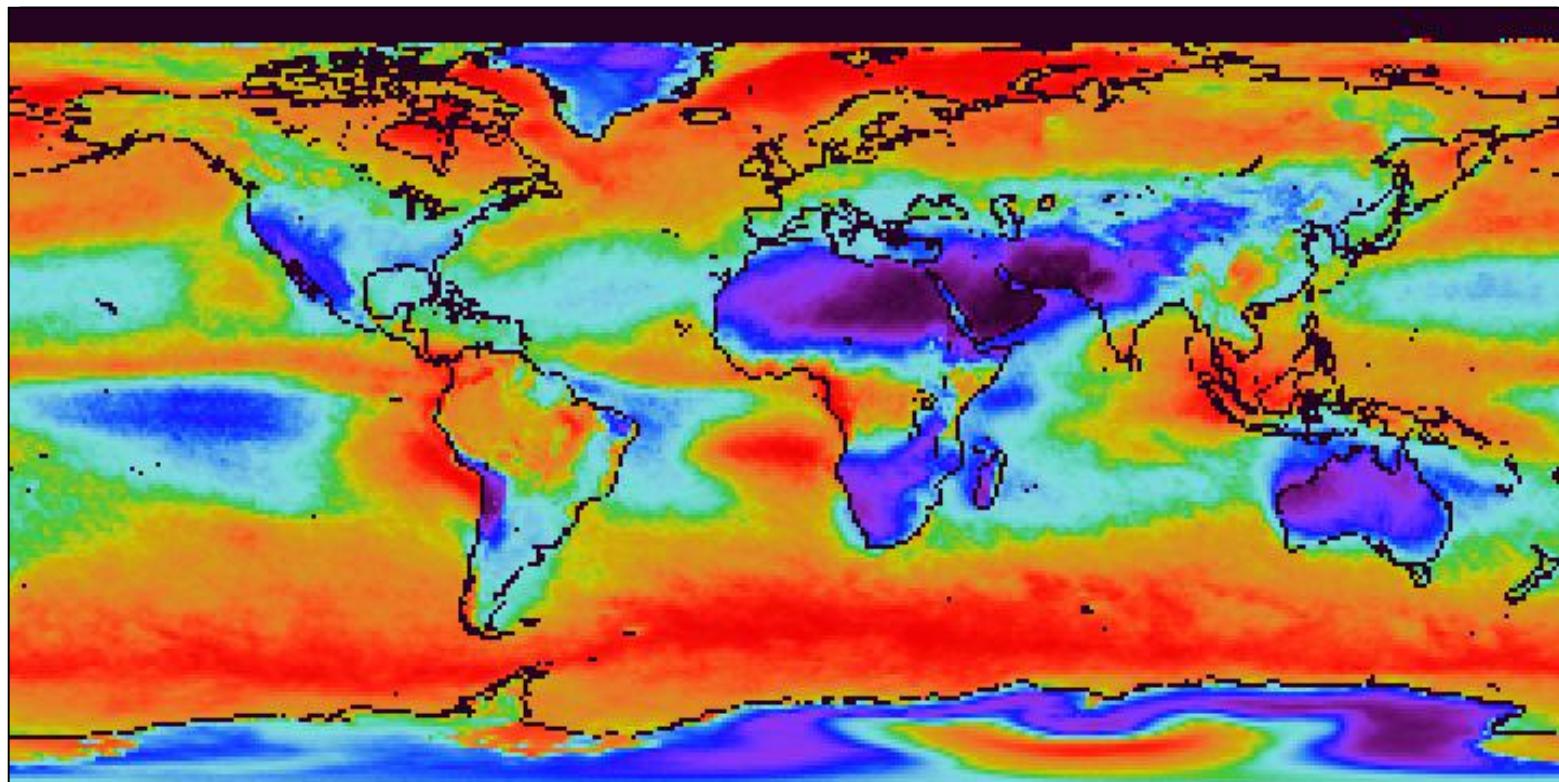
August



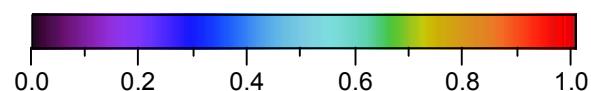
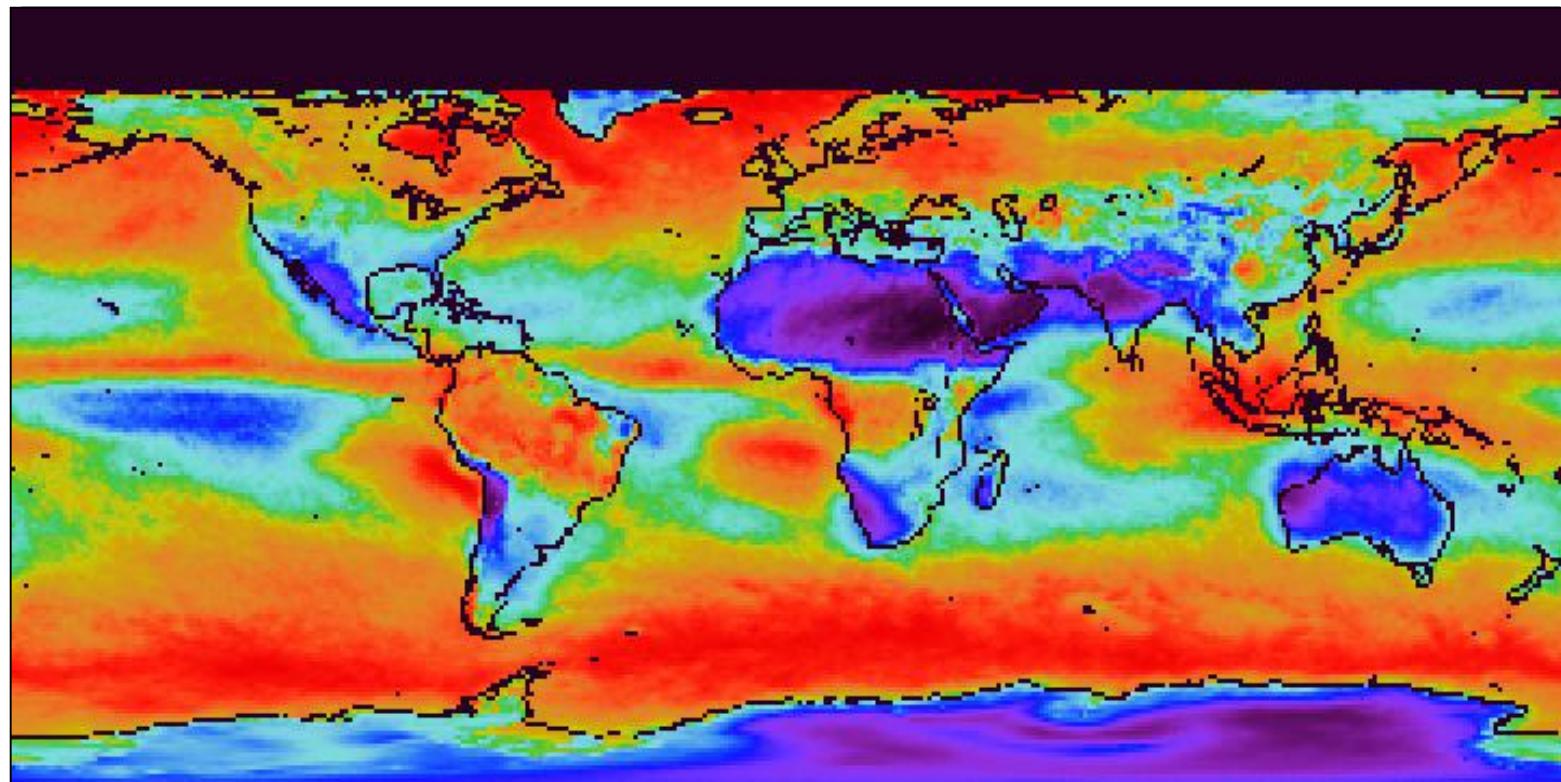
# September



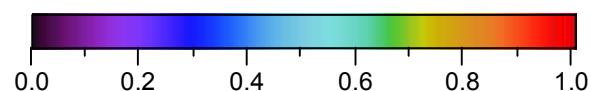
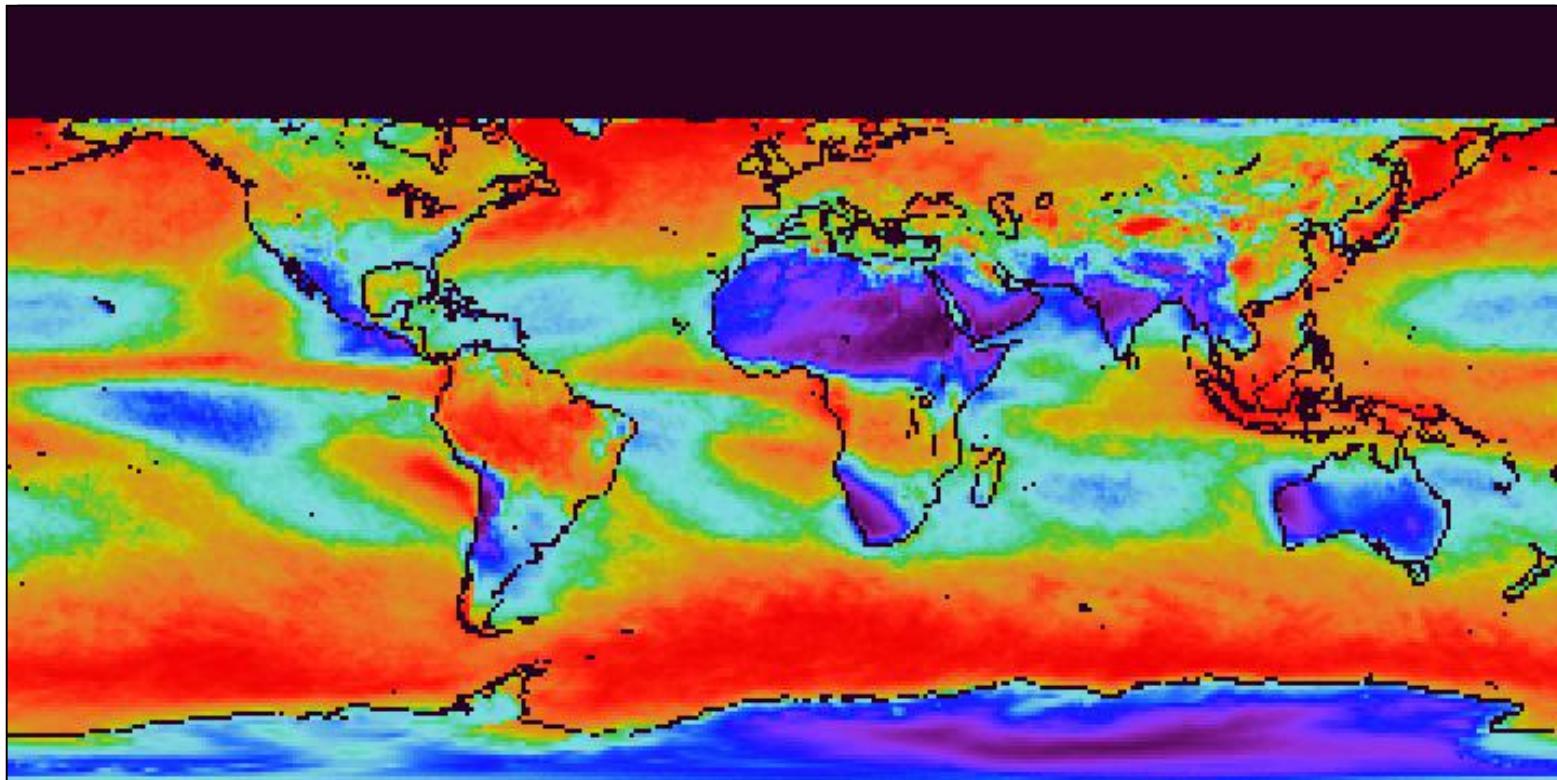
# October



November



December

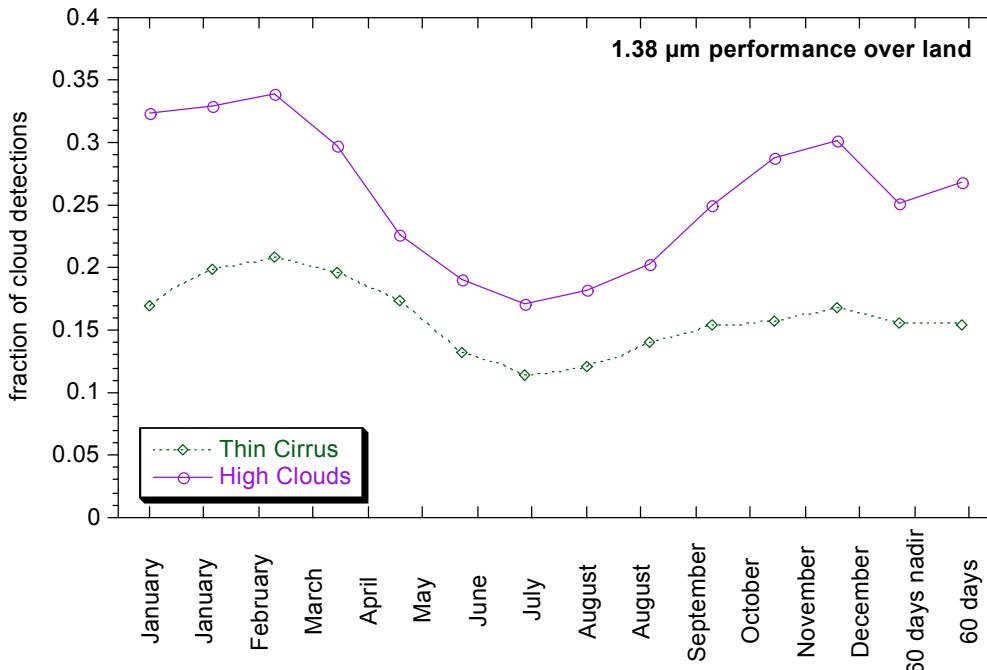
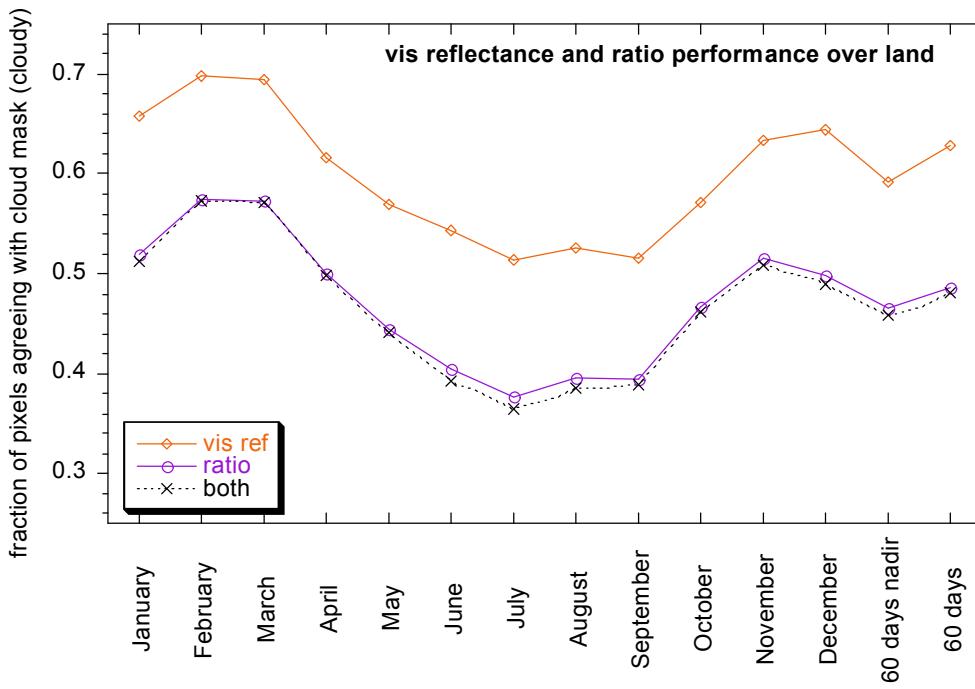


# MODIS-“lite” as a proxy to OLI+TIRS

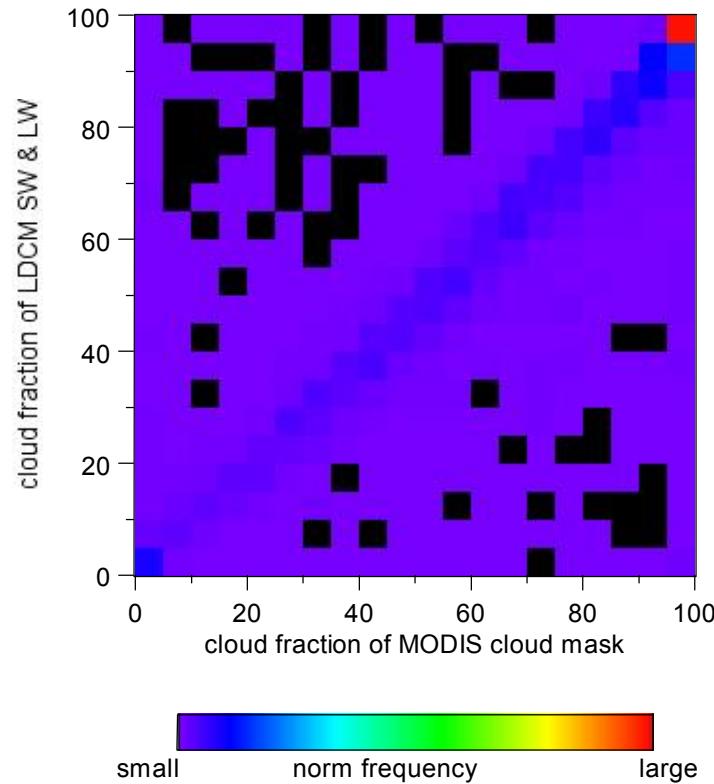
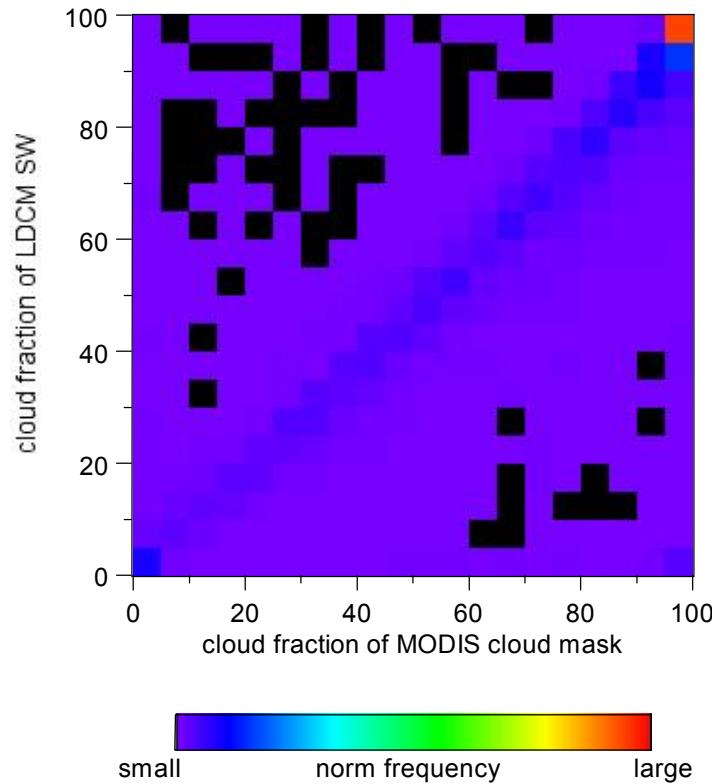


	Daytime Ocean	Nighttime Ocean	Daytime Land	Nighttime Land	Daytime Snow/ice	Nighttime Snow/ice	Daytime Coastline	Nighttime Coastline	Daytime Desert	Nighttime Desert
$BT_{11}$ (Bit 13)	✓	✓								
$BT_{13:9}$ (Bit 14)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
$BT_{6:7} \&$ $BT_{11} - BT_{6:7}$ (Bit 15)	✓	✓	✓	✓	✓	✓	✓	✓	✓	○
$R_{1:38}$ (Bit 16)	✓		✓		✓		✓		✓	
$BT_{3:7} - BT_{12}$ (Bit 17)				✓		✓				✓
$BT_{8:6} - BT_{11} \&$ $BT_{11} - BT_{12}$ (Bit 18)	✓	✓	✓	✓			✓	✓	✓	✓
$BT_{11} - BT_{3:9}$ (Bit 19)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
$R_{0:66}$ or $R_{0:87}$ (Bit 20)	✓		✓		✓		✓		✓	
$R_{0:87}/R_{0:66}$ (Bit 21)	✓		✓				✓			
Delete this row.										
$BT_{7:3} - BT_{11}$ (Bit 23)				○				○		○
Temporal Consistency (Bit 24)	○	○								○
Spatial Variability (Bit 25)	✓	✓								

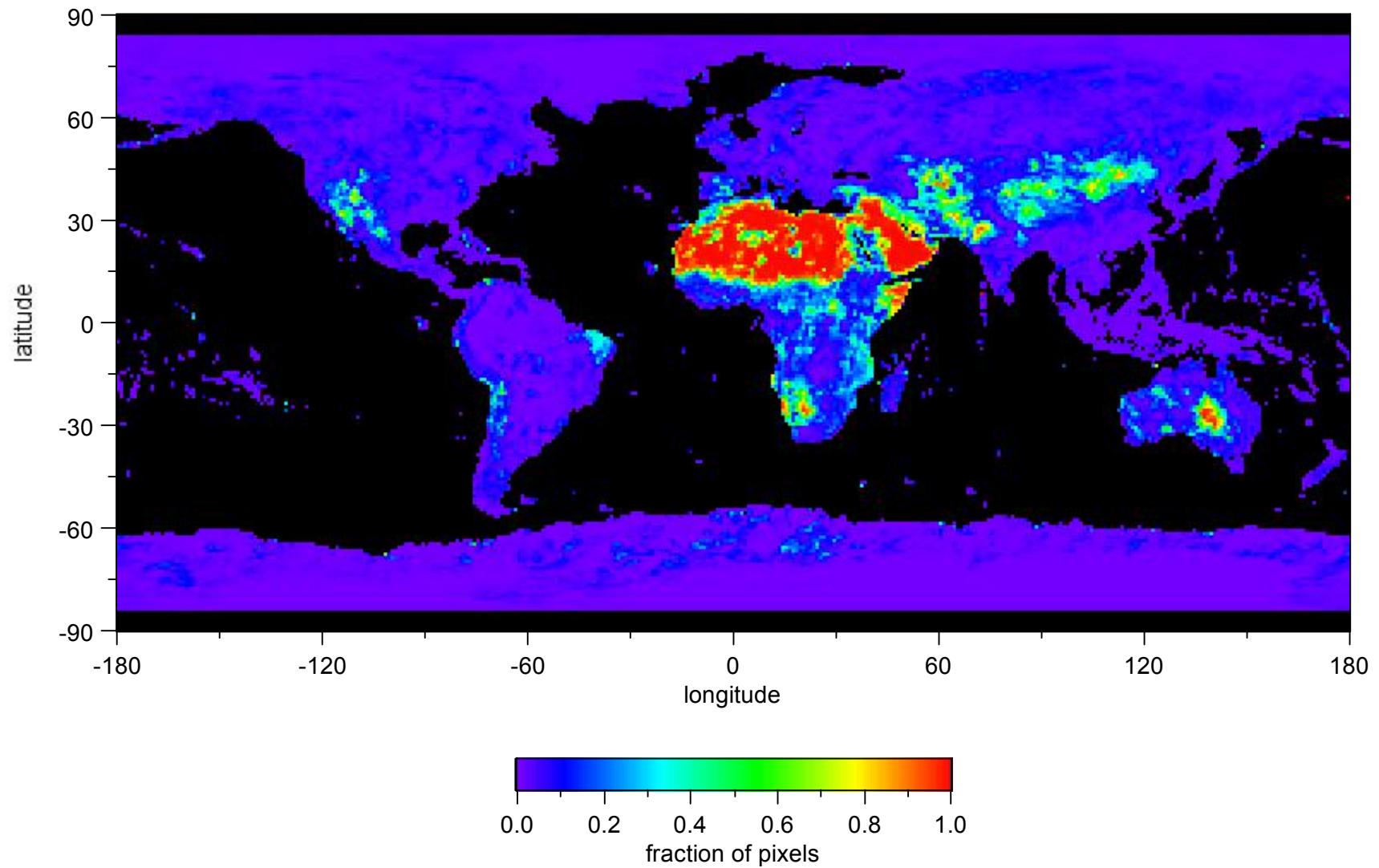
MODIS Cloud Mask spectral tests



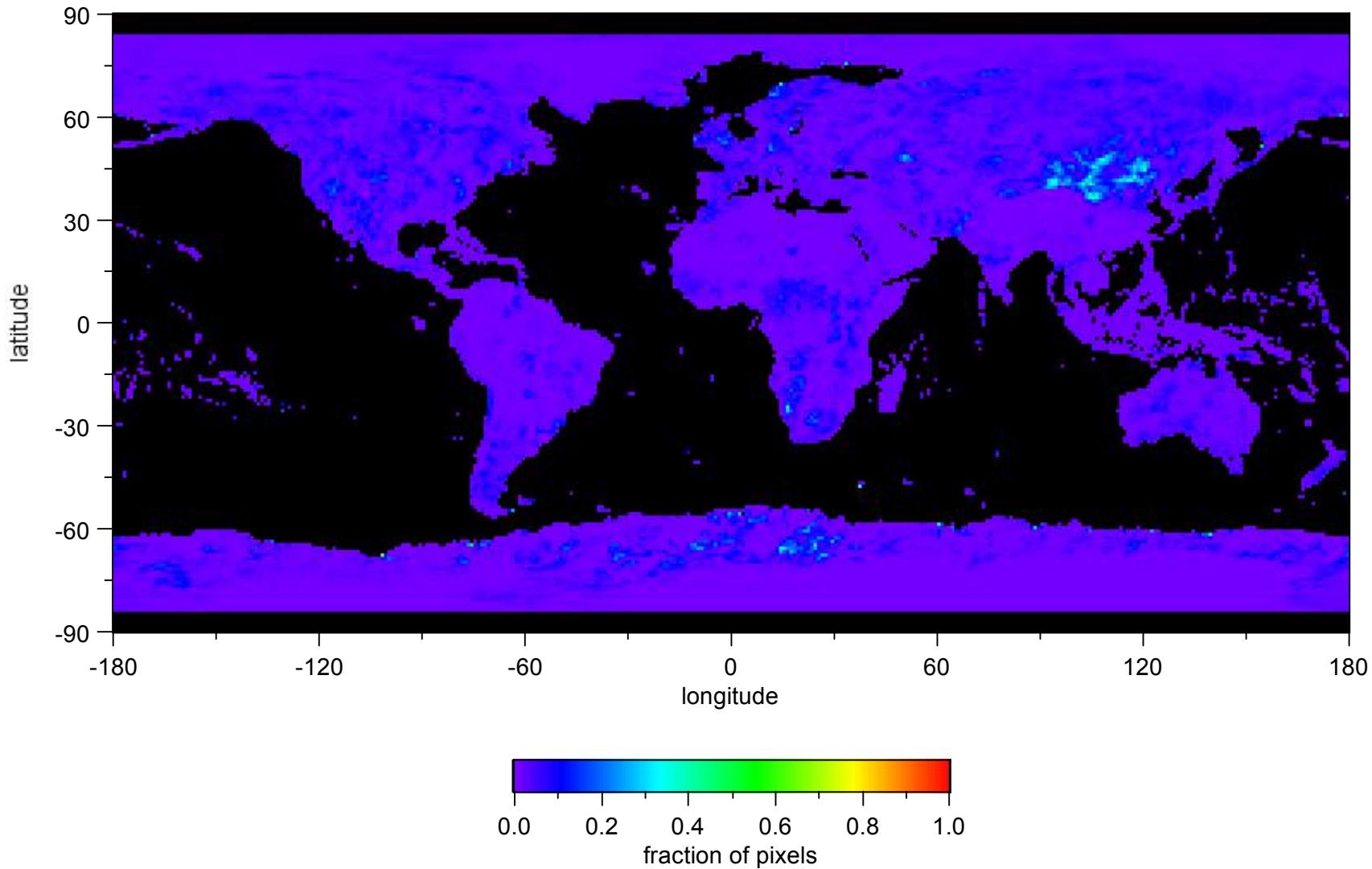
# Full MODIS cloud mask vs. LDCM-like cloud mask



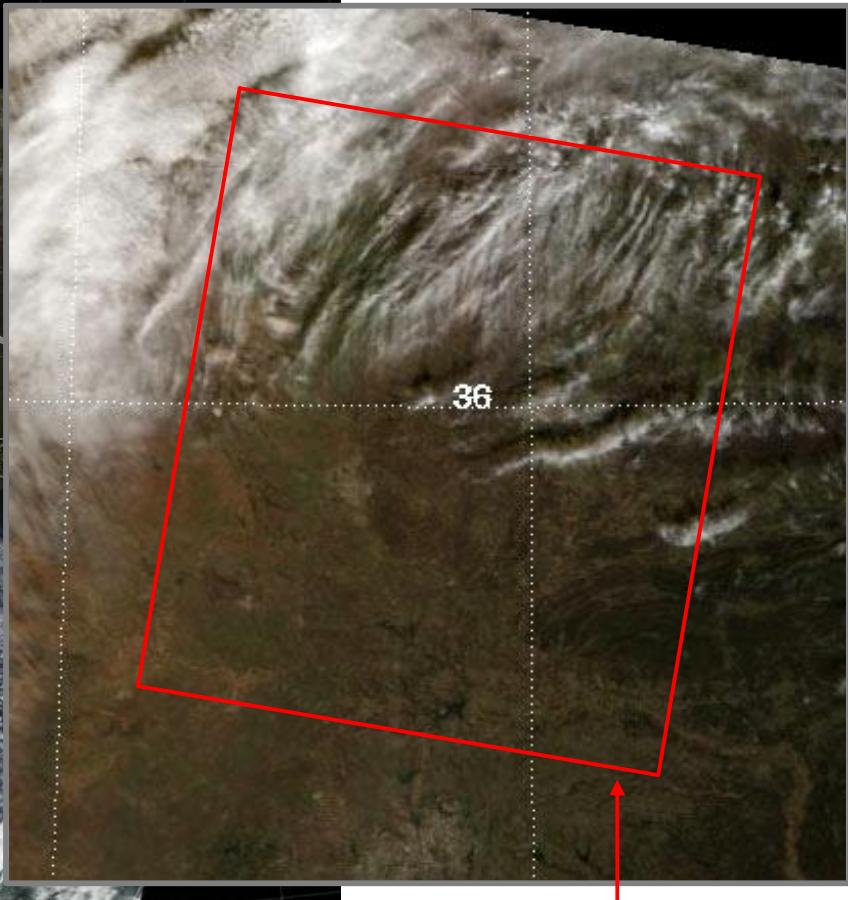
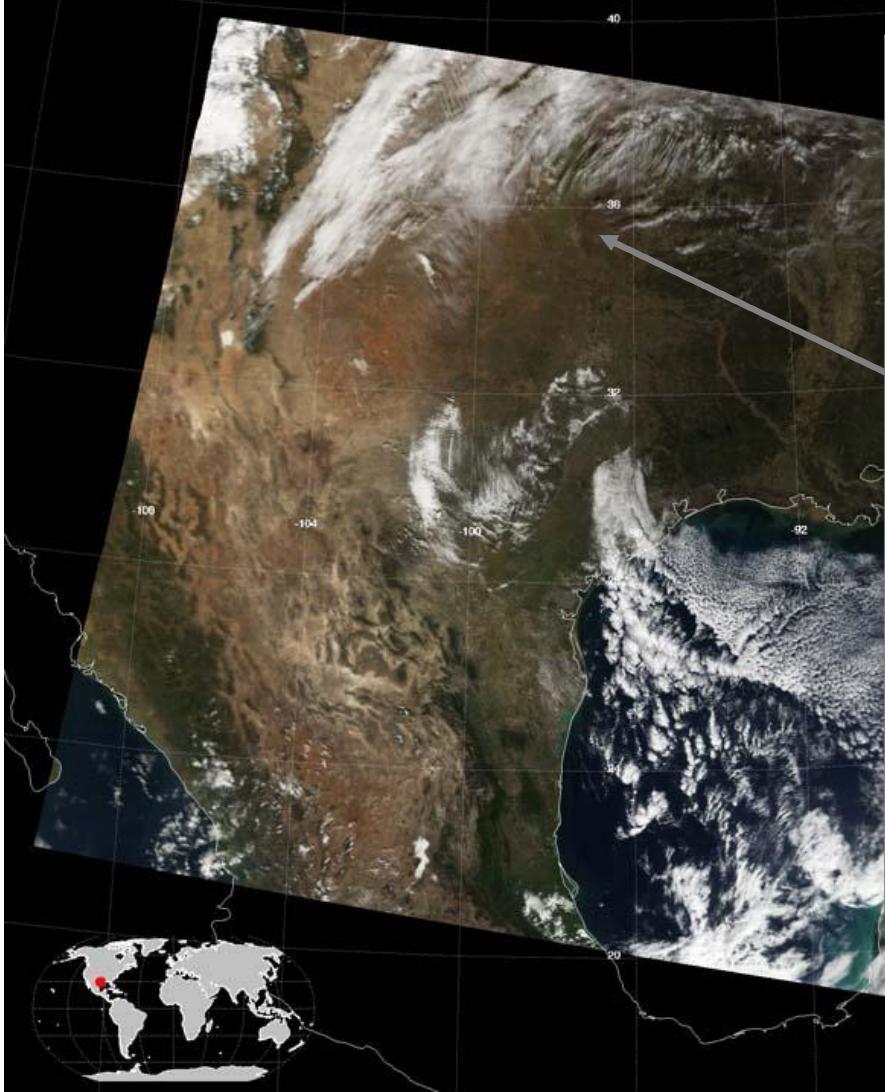
# Fraction of MODIS clear pixels that LDCM SW “thinks” is cloudy



# Fraction of clear MODIS pixels 1.38 $\mu\text{m}$ “thinks” has thin cirrus



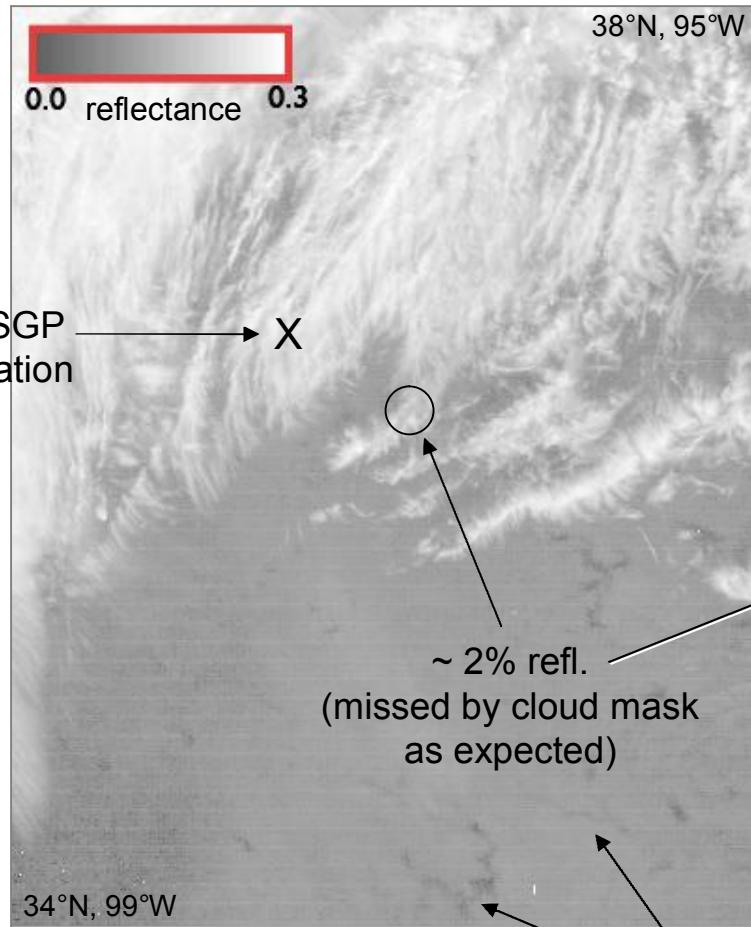
MOD021KM.A2001355.1715.005.2005328172743.hdf  
Terra MODIS Truecolor Scene



Region examined in  
following slides

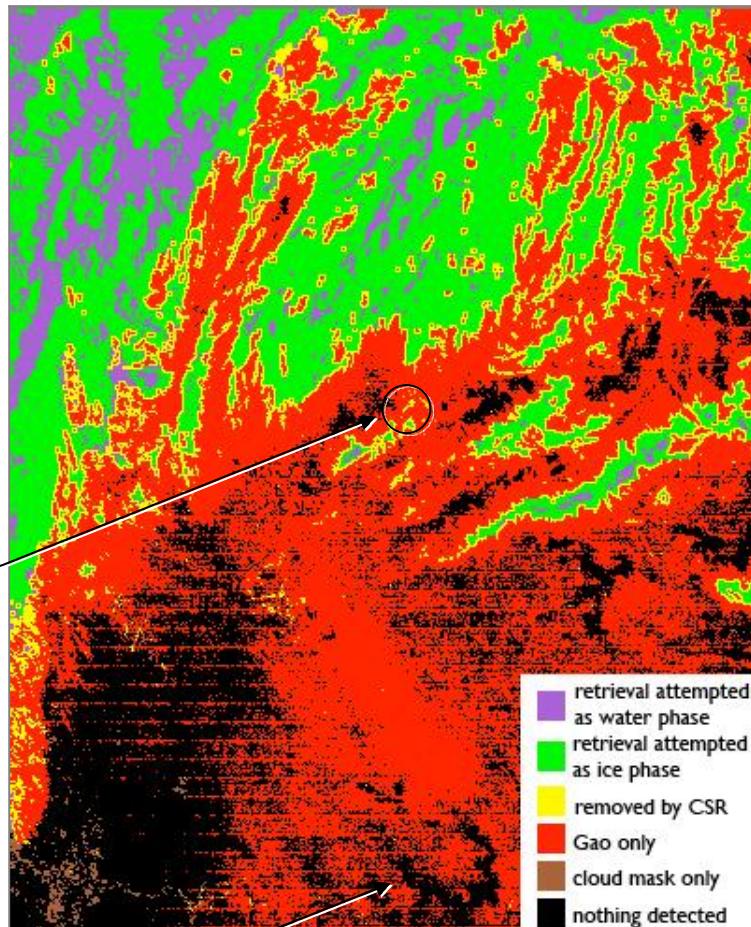
## Cirrus\_Reflectance

(B.-C. Gao product in MOD06, represents 0.65  $\mu\text{m}$  band reflectance inferred from 1.38  $\mu\text{m}$  observations)



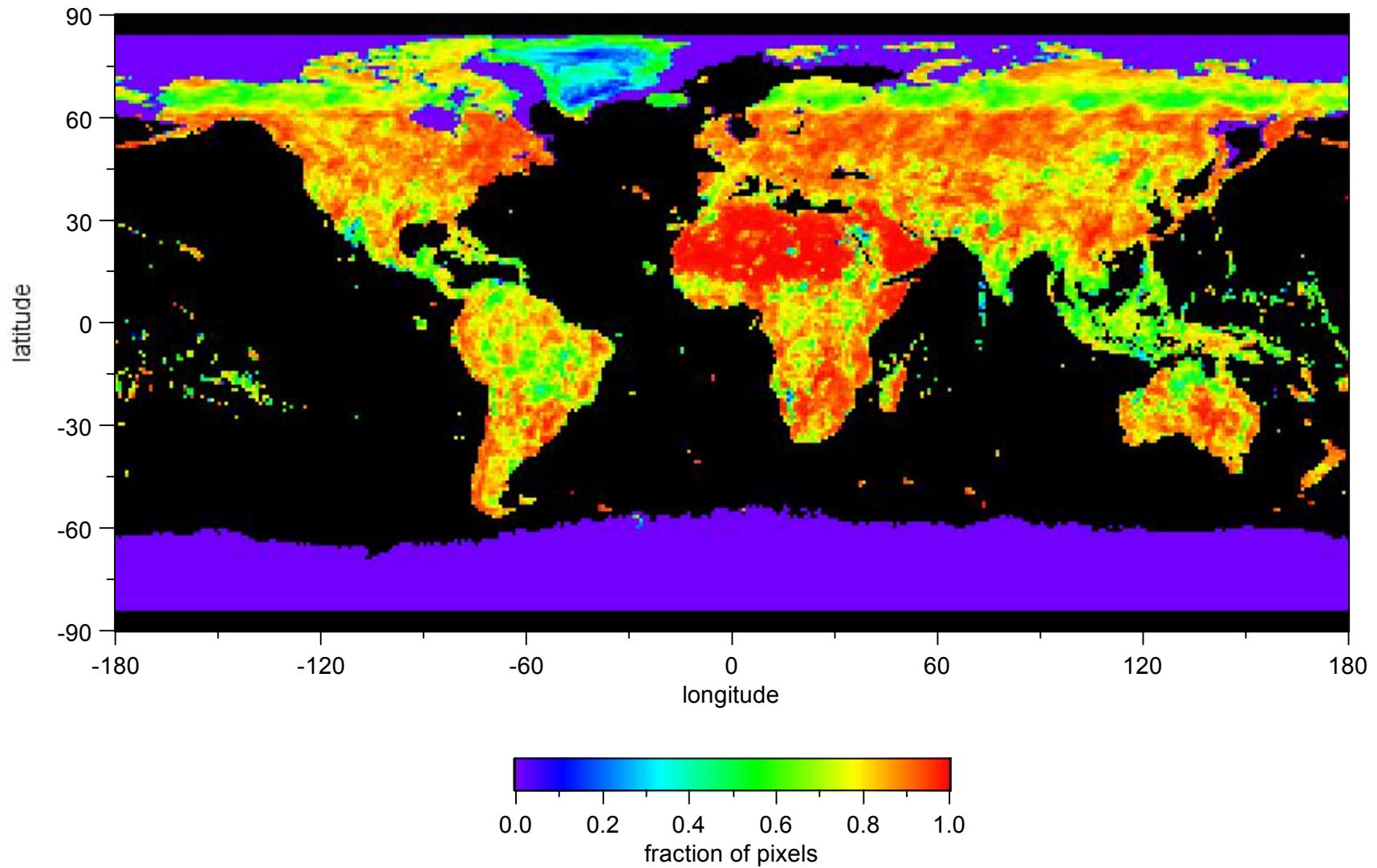
## Various Scene Masks

(cloud mask detection represented by all colors but red and black, see notes for details)

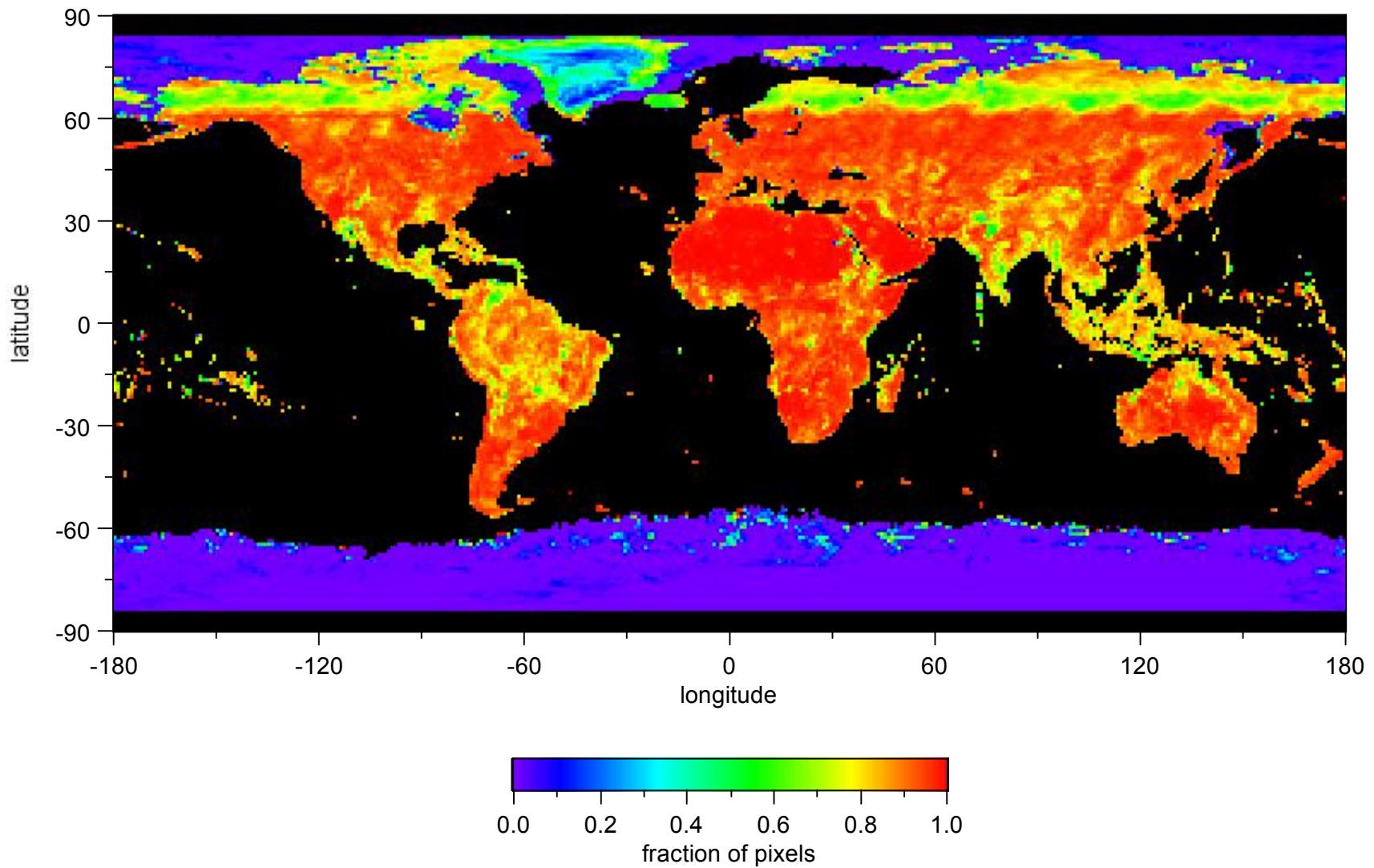


surface features surrounded by false “cirrus” detection

# Fraction of MODIS cloudy pixels that VIS ref agrees with



# Fraction of MODIS cloudy pixels that LDCM SW also “thinks” is cloudy



# Subset of scenes used in Irish et al., PERS (2006)

